SOCIETY OF NORTH AMERICAN GOLDSMITHS

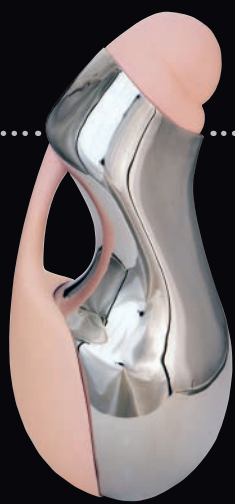
METALSMITH

SPRING 2019 / VOL. 2 NO. 1

TECH

TECH ELEMENT

Putting Clasps at the Center of Jewelry

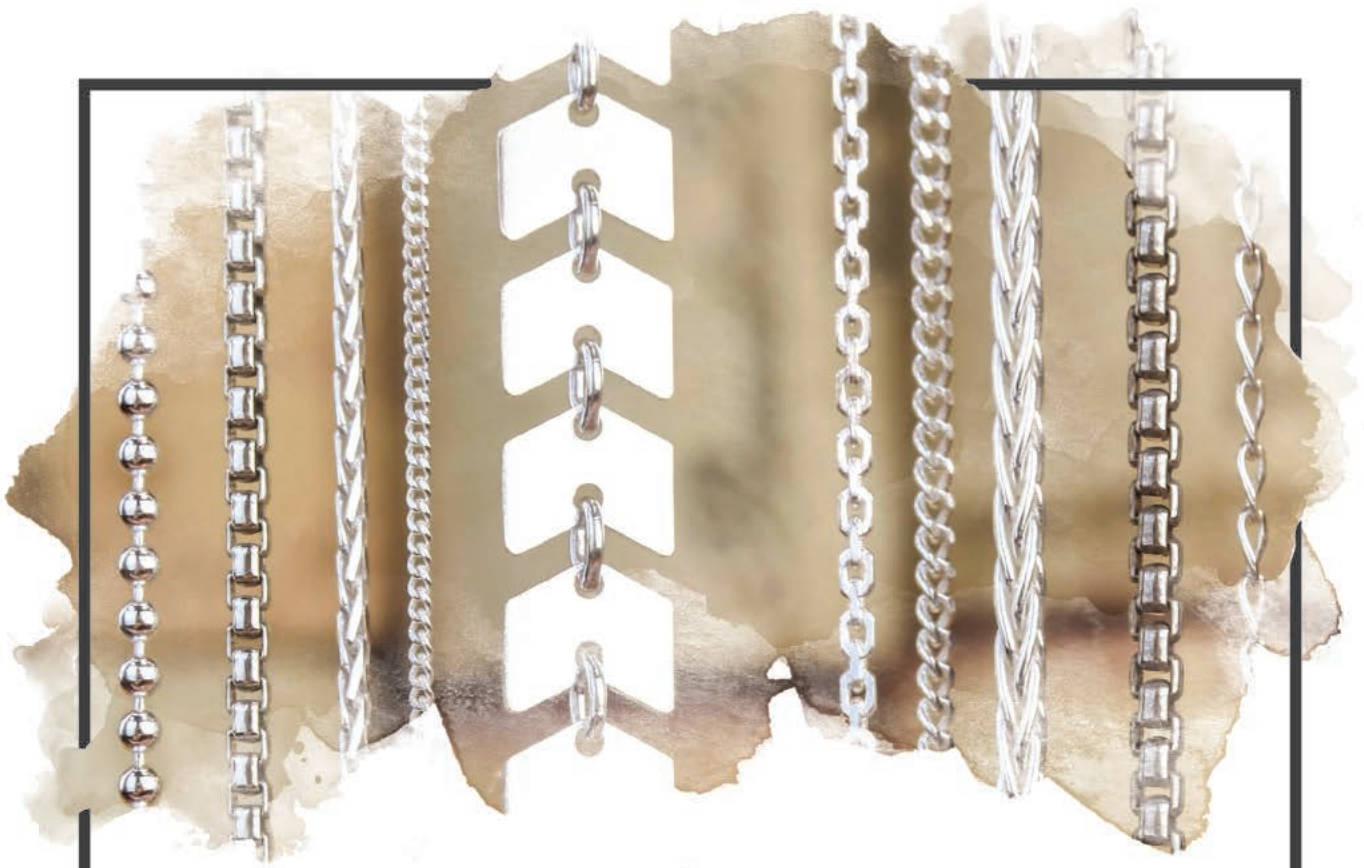


TECH TEACH

Utilizing Digital Processes for Layout and Design Transfer

TECH TALK

Translating Jewelry Techniques to Larger Scales



We Get It

Shop at HalsteadBead.com for so much more than beads.

You'll find a huge selection of sterling silver chain, findings and settings.
Need great materials, rapid turnaround, informative articles and outstanding service?
Ask around and find out why Halstead customers love working with us.
We get it.

Halstead™
QUALITY JEWELRY SUPPLIES ON DEMAND.

$100 MINIMUM | HALSTEADBEAD.COM | 800.528.0535

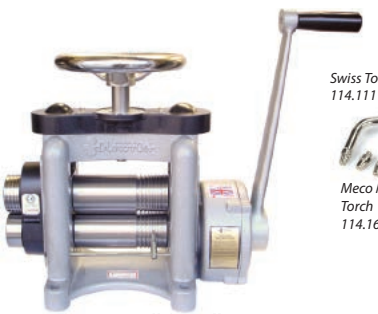
Tools & Findings You Will Love

Workbenches
013.001

Pepe Rolling Mills
90 to 160mm

Genuine Swiss Made Files & Gravers

Pepe Disc Cutter
125.140



Durston Rolling Mills
128.118N
150mm Combo

Torches & Soldering Kits

Green Lion Saw Frame
149.695

Metals

Findings

save 5%

Right Now
Use Online Coupon Code

GEWT

Expires 10/31/2019

Shop Online & Save
800.772.3456
510.832.0355

OttoFrei.com

Otto Frei
Quality Jewelry Tools & Findings Since 1930

Gemstones from all across the world

S.P.B CREATIONS / S.P.B. GEMS

JCK Las Vegas
(May 30-June 3, 2019)
Booth# 55007

AGTA Gem Fair Las Vegas
Las Vegas Convention Center
(May 30-June 3, 2019)
Booth# 1018

SPB

1-888-SPB-GEMS

212-719-5170 • 888-SPB-GEMS • email:info@spbgems.com • www.spbgems.com

BGK Graphics

METALSMITH TECH

CONTENTS

4 FOREWORD

10 THE NEXT GENERATION
Talking CAD at SCAD
As it keeps pace with industry and digital innovation, SCAD prepares students for a world of creative possibilities. *Andrea DiNoto*

14 TECH TOOLKIT
In/Tangible Tools
Jeffrey Clancy

16 THING OF THE PAST
Plumbing the Depths: Haptic Research, Historic Tools
Kendall Reiss

TECH ELEMENT
20 Hidden Powers: Putting Clasps at the Center of Jewelry
Two jewelry makers shine light on an oft-overshadowed functional element: the clasp. *Anna Tabakhova and Alison Antelman*

TECH TALK
24 Translating Jewelry Techniques to Larger Scales
When it comes to Eastern repoussé, size is no object for this artist. *Victoria Lansford*

TECH TEACH
28 Utilizing Digital Processes for Layout and Design Transfer
Straightforward steps for augmenting analog studio practices with digital tools. *Frankie Flood*

Cover:
- **Michael Boyd** *Ruby Necklace*, 2017 (see p.22)
- **Casey Newberg** *Birth pitcher*, 2018 (see p.29)
- **Victoria Lansford** *Turtle Media Screen Doors*, 2017, (see p.24)

Metalsmith is published by the Society of North American Goldsmiths

Artists. Designers. Jewelers. Metalsmiths. www.snagmetalsmith.org

The Society of North American Goldsmiths advances jewelry and metalsmithing by inspiring creativity, encouraging education, and fostering community.

Interim Editor
Adriane Dalton, adalton@snagmetalsmith.org

Contributing Editor
Kate Fogarty

Graphic Design
Luke Hayman, Elyanna Blaser-Gould, Pentagram

Advertising
John Garbett, jgarbett@snagmetalsmith.org

SNAG Executive Director
Gwynne Rukenbrod Smith

SNAG Board Of Directors
President
Nicole Jacquard
President-Elect
Brian Ferrell
Secretary
Becky Mcdonah

Michael Brehl, Jill Baker Gower, Dominique Bereiter, Kat Cole, Jack da Silva, Dianne deBeixedon, Anne Fiala, Diana Hulse, Brigitte Martin, Tedd McDonah, Ezra Satok-Wolman, Elizabeth Shypertt, Emily Stoehrer, April Wood

Printer Allied Printing, committed to using environmentally friendly materials and methods.

Metalsmith (ISSN 0270-1146) is published both in print and digital formats in February, May, August, and November by SNAG, PO Box 1355, Eugene, OR 97440, 541.345.5689, www.snagmetalsmith.org.

Membership rates: $94/year and up, full membership includes four-issue subscription to *Metalsmith*. Special rates available. Subscription to only *Metalsmith*: $33/year and up.

Postmaster/Members/Subscribers/Copies
Metalsmith is not forwarded by the post office. Send all address changes and any other requests, including missing issues, to SNAG, PO Box 1355, Eugene, OR 97440, 541.345.5689, info@snagmetalsmith.org. Claims for missing issues are accepted only if received within three months of publication.

The opinions expressed in *Metalsmith* are those of the authors and not necessarily those of the staff or directors of SNAG or *Metalsmith*.

Metalsmith is indexed in the Art Index and EBSCO Media. Newsstand distribution: COMAG Marketing Group, 155 Village Blvd, Princeton, NJ 08540.

Copyright 2019 by Society of North American Goldsmiths, all rights reserved. Reproduction in whole or in part without written consent is prohibited.

Printed in the U.S.A.

In biological terms, adaptation is defined as a change that improves an organism's suitability for its environment. Presumably, survival is the measure of successful adaptation. Whether we define ourselves as makers, educators, thinkers, or all of these and more, we engage with adaptation by solving problems, using tools, streamlining production methods, and incorporating new technologies into our practices.

When commissioned to create door panels and a room divider for a bespoke yacht, Victoria Lansford adapted her Eastern repoussé tools and working methods to accommodate a larger scale. In "Hidden Powers," Alison Antelman and Anna Tabakhova showcase clasps that are both highly technical and aesthetically suitable to their environments. When it comes to the relationship between makers and their tools, articles by Kendall Reiss and Jeffrey Clancy speak to two different ways in which one can change the other. In addition, this issue is bookended by perspectives on adapting to digital technology. In "Talking CAD at SCAD," Andrea DiNoto interviews Jay Song, Chair of Jewelry at Savannah College of Art and Design, about preparing tech-savvy students for creative careers. And the first article in a series by Frankie Flood lays the groundwork for integrating digital and analog studio practices.

Now entering its second year, *Metalsmith Tech* is a platform for exchanging information and ideas. Such exchanges rely on the participation of you, the readers. I am here as a willing and eager collaborator, and invite you to share your ideas, proposals, critiques, and praise with me: editor@snagmetalmsith.org. I look forward to hearing from you. ***—Adriane Dalton, Interim Editor***

The mission of *Metalsmith Tech* is to focus on techniques, processes, educational philosophies and ideas, professional development topics, and new technology in the field of jewelry and metalsmithing. The magazine will include both contemporary and historical references, highlighting a diverse range of approaches to jewelry design and metalwork, including professional practices, creative influences, and new trends.

MJSA JOURNAL

Overflowing with Expertise.

MJSA JOURNAL
INSPIRATION FOUND
The 2018 Winners of the MJSA Vision Awards
Diamond Detection
Tips for investing in synthetic diamond screening technology
Made From Scratch
Jewelers cook up their own tools
Hold Still
A Mystery No More
A look into the assaying methods refiners use to determine the value of a lot

Published monthly, the award-winning *MJSA Journal* is the premier magazine dedicated to all aspects of making jewelry. No other publication devotes as many pages per month to design ideas, new manufacturing techniques, bench tips, business and marketing strategies, fashion trends, and time-saving technologies.

Go to *MJSA.org/Journal* to start your subscription, including the *MJSA Sourcebook—the* resource for the latest jewelry-making tools, supplies, and technologies!

MJSA JOURNAL IS PUBLISHED BY MJSA, THE U.S. TRADE ALLIANCE DEDICATED TO PROFESSIONAL EXCELLENCE IN JEWELRY MAKING AND DESIGN

THE LOOP

2019 SNAG CHICAGO

COMING FULL CIRCLE - 50 YEARS OF SNAG

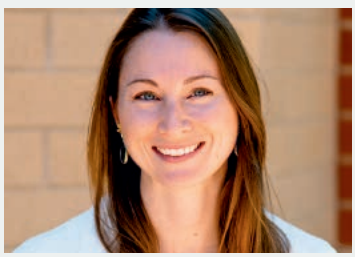
48TH ANNUAL SNAG CONFERENCE

CHICAGO, IL | MAY 22–25, 2019

In addition to a powerful lineup of presentations, exhibitions and events, SNAG is pleased to offer pre-conference workshops geared toward empowering entrepreneurs to succeed in the field.

Workshops will take place at The Palmer House Hilton on Wednesday, May 22, 2019, and tuition is only $60 for each! See website for details and registration information.

Preparing for the Divorce While Planning the Wedding: Risk Management for Artists, Educators, and Gallerists with Chris Balch



Budgeting from the Bottom Up with Mariel Diaz

Creative Social Media: Best Practices to Get Noticed & Build Your Brand with Sue Koch

Bootstrap Branding for Small Business with Celina Zisman

For more information visit the conference pages of SNAG's website at **snagmetalsmith.org**

SPONSORS:

Rio Grande • Halstead • B. Golden Jewelry School • Gangi Gems • MJSA • Otto Frei • Creative Side Jewelry Academy
American Craft Council • Boris Bally Humanufactured • Meetings a la Carte • Pistachios Gallery • Pocosin Arts • Touchstone Center for Crafts
Aaron Faber Gallery • Jewelry Creations Workshop • Mendocino Art Center • Metalwerx, Inc. • Peters Valley School of Craft
University of Kansas • Arrowmont School of Arts & Crafts • Gallery 2052 • Metal Museum • Techform • United Precious Metals Refining, Inc.

Whether you
wire it, bead it, flux it, post it, pierce it,
string it, pavé it, refine it, enamel it,
solder it, mount it, clasp it, link it...
(you get the idea)

WE STOCK IT

Myron Toback Inc.
Earning the Industry's Trust Everyday Since 1965

For Immediate Delivery or For Our Illustrated Catalog Call Toll Free 800-223-7550
545 5th Avenue #1000, New York, NY 10017 (entrance located on E 45th Street)
212-398-8300 • Fax 212-869-0808 • MyronToback.com • info@MyronToback.com
Follow us on Instagram @myrontoback.com

SANTA FE
JEWELERS SUPPLY
Hand Selected Gems of the Southwest

Visit our website:
www.sfjs.net
800.659.3835
Displays • Findings
Gemstones • Metals • Tools

CAD, CNC, 3D PRINTING, MOLDING, PATTERNS, CASTING, FINISHING, SETTING.

FAST, RELIABLE SERVICE IS WORTH ITS WEIGHT IN GOLD

800-637-CAST NEW CUSTOMERS FIRST FREE PRINT. MENTION THIS AD.

AU enterprises

PRIVATE LABEL MANUFACTURERS

A&A JEWELRY SUPPLY

THE SOURCE FOR:

- Tools
- Supplies
- Findings
- Displays
- Packaging
- Lighting

Mention this ad and receive **$10 off** your order of $100 or more, or **$50 off** your order of $400 or more.

www.aajewelry.com | 213.627.8004 | orders@aajewelry.com

Craftoptics®

Magnify your talents®

I can see clearly now, the strain is gone.

Magnification and light customized with your Rx

MONEY BACK GUARANTEE

DREAM BEAM

craftoptics.com • 888.444.7728

A good tool makes all the difference.

Bowl overlay by James Miller, hand cut with a Knew Concepts Jeweler's Saw.

WWW.KNEWCONCEPTS.COM

Opposite:
Process image and finished work by Seung Jeon Paik (SCAD MFA 2018).

THE NEXT GENERATION

Talking CAD at SCAD: A Conversation with Jay Song, Chair of Jewelry, School of Fashion, Savannah College of Art and Design (SCAD)

A curriculum that mixes tradition with innovation prepares the next generation of tech-savvy jewelers for a rapidly changing field.

BY ANDREA DINOTO

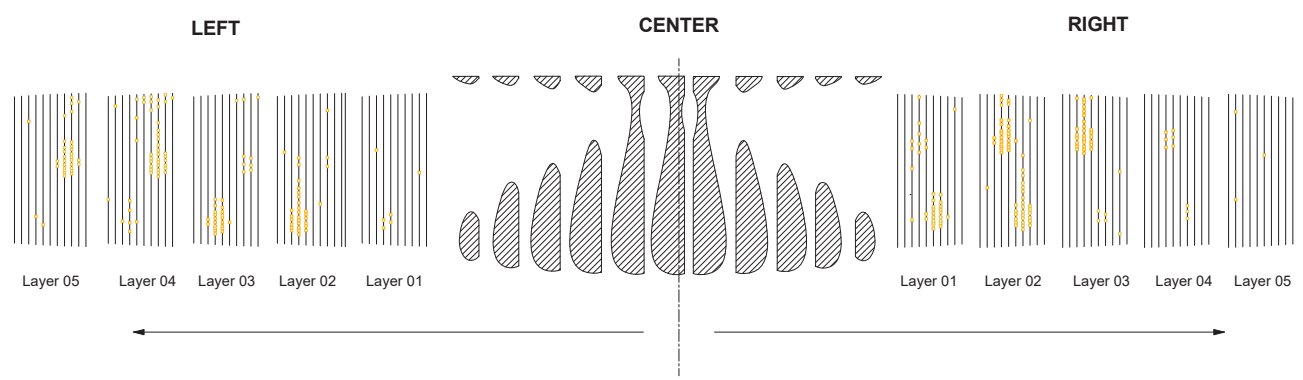
Jay Song was born and raised in Daejeon, South Korea. She has a bachelor's degree in law from Hannam University in Korea and an MFA in Jewelry from Savannah College of Art & Design (SCAD). She has been a professor in the jewelry department at SCAD since 1999, when she became its chair. Her work in metal and mixed media has been exhibited internationally in galleries and museums in China and Korea, and throughout the United States. Established in 1978, SCAD has a unique presence in its historic city. With no centralized structure, the college houses each of its schools and related programs in repurposed buildings—more than thirty of them—throughout Savannah. Each is equipped with state-of-the-art technology, ensuring students will graduate with highly competitive skills in their chosen field.

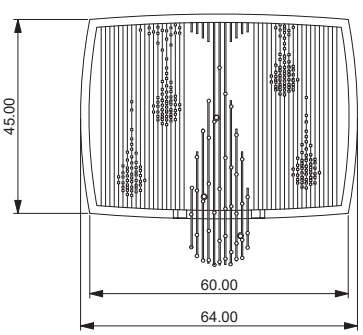
You have been updating the SCAD curriculum now for ten years, much of it in the area of technology. What are the major trends in jewelrymaking today?
Digital drawing, 3D modeling, 3D scanning, 3D precious metal printing, and parametric and generative design are all pervasive and widely used in the industry as creative tools. Digital fabrication enables us to produce and realize design concepts that were impossible by traditional methods. There is unimaginable potential in the world of digital manufacturing.

How does SCAD prepare students for jobs within the jewelry industry that may not involve actual making?
Our mission is to prepare talented students to become innovative leaders in their industry. SCAD's jewelry program is the largest degree-granting program in the country. The curriculum is built on fostering creative thinking strategies, innovation in design practices, and a strong foundation in obtaining skills to fulfill diverse student needs. Our students have access to advanced industry equipment including computerized engravers, laser welders, laser cutters, 3D printers, and 3D milling. In addition, the jewelry computer lab is certified as a Rhino Fablab by McNeel Group, allowing students to obtain official Rhinoceros certification. Also, our innovative studio, SCADpro, pairs jewelry students and alumni with industry leaders (Fossil, Ernst Benz, and Swarovski, for example) to learn how to propel a prototype to market, create sustainable companies, and launch their projects, all within one year.

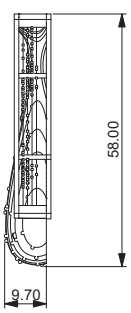
For those students who aspire to become studio artists, how are they guided toward developing an individual aesthetic?
Whether students desire to become studio artists, commercial designers, or product developers, our expectations for them remain the same: an emphasis on the development of new ideas and possibilities through experimental materials, and obtaining advanced knowledge in technologies to meet industry's new demands. I must say that I do not place a hierarchy on our students' dreams for a career, whether it is to create products for clients or for themselves as artists. The first stages of concept development involve writing research papers, sketching and rendering, sample making, and building both a physical and digital process book leading to the final formal presentation. First-quarter seniors are required to submit at least 200 concept sketches and finished renderings, 20 pages of a physical process book, a public presentation, and 40 pages of an e-process book. To further stimulate creativity, SCAD offers students

I truly believe we should embrace the new reality of jewelry and prepare students to accept that the field extends beyond the bench and drafting table.

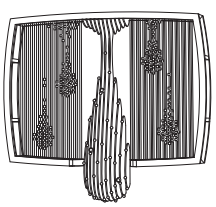




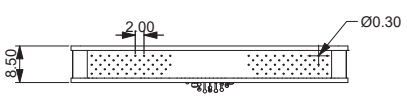
FRONT



RIGHT



PERSPECTIVE



TOP

the opportunity to study at our global campuses in Hong Kong and Lacoste, France. Connecting theory with practical experiences in the field through partnering with established artists pushes our students to further evolve as studio artists. I also promote and sponsor students to enter national and international competitions and exhibitions. SCAD is the only academic institution to be invited to top-ranked national shows, including the Smithsonian Craft Show, Philadelphia Museum of Art Craft Show and American Craft Council Show, to exhibit and sell their own work.

Recently, the SCAD Museum of Art hosted the exhibition *Jewelry of Ideas: The Susan Grant Lewin Collection.* How did students respond to the objects on display?
The installation, curated by the SCAD exhibitions and design teams, featured the jewelry in a black-painted gallery under large Plexiglas domes to great dramatic effect. The students' first impression was that the printed image is no substitute for the real thing. Many of them had only seen the exhibited jewelry in books, especially the famous Otto Künzli bracelet *Gold Makes You Blind* and Gijs Bakker's *Blinker Brooch.* It was important for them to see these pieces in person.

The use of alternative and/or ephemeral materials is well established in the art jewelry world. What is your view of their use vis-a-vis preservation? Wearability?
When jewelry artists started to question and redefine the very notion of jewelry, everything was challenged. Jewelry as art, I do not think, is concerned with commercial wearability, nor is preservation any longer important. In a rapidly changing world, we exist virtually via social media. Augmented reality, as well as virtual reality, have become marketing tools that enable customers to experience products in a new way. In the near future, even the physicality of objects will be tested.

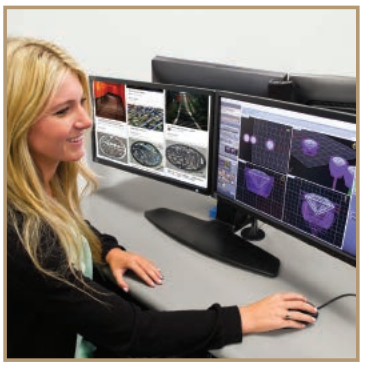
SCAD's jewelry department is part of the School of Fashion. How do students from these two fields interact in the creation of projects?
Each fall quarter in the School of Fashion, senior students from our accessory, fashion, fiber, and jewelry programs meet with each other to explore collaborative opportunities. Many of these collaborations are featured in our annual SCAD fashion shows in Savannah, Atlanta, Hong Kong, and Lacoste France. Most students use their digital portfolios, personal websites, Behance (a showcase for creative work), Instagram, etc. to pitch their concept to the potential partners.

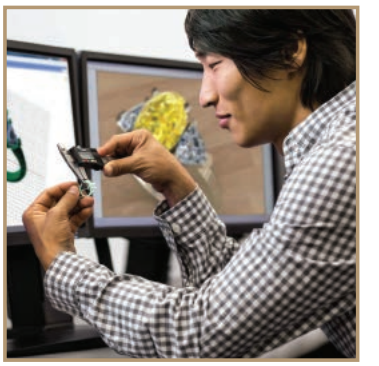
SCAD proudly states that 100 percent of graduates find employment. How is this determined?
The Career and Alumni Success (CAS) staffs work closely with current students and alumni regarding their careers. Each year, nine months after graduation, CAS reaches out to each graduate to report on their current job situation. Based on this data, we know that the SCAD jewelry department has a 100 percent employment rate in the jewelry field, and that 99 percent of Spring 2017 SCAD graduates were employed, pursuing further education, or both within ten months of graduation. Our graduates are employed by prestigious companies including Chanel, Tiffany & Co., David Yurman, Swarovski, Fossil, Michael Kors, Kate Spade, Coach, Haskell Jewels, Signet, Camuto, FAF/Catherine Stein Design, Alexis Bittar, Lucky Brand, John Hardy, Anthropologie, and many more.

What future technologies do you envision for jewelry?
As an educator, I truly believe we should embrace the new reality of jewelry and prepare students to accept that the field extends beyond the bench and drafting table. While traditional jewelry is holding its position stronger than ever, the virtual aspect will continually push us to accept its presence. The war between physical vs. virtual is coming, whether we like it or not. In the near future we could have a digital jewelry box; an inventory, if you will, to adorn our virtual identity.

Andrea DiNoto writes on art, craft, and design.

Process images and finished work by Jennifer Lee Hallsey, Professor of Foundation Studies and Jewelry at SCAD.





Learn the Techniques of Modern Jewelry Design and Manufacturing

Develop the skills to create a successful career in today's gem and jewelry industry. Turn your ideas into high quality pieces of fine jewelry through hands-on, action-oriented coursework. Learn from experienced instructors while practicing your skills using professional equipment. GIA Jewelry Manufacturing Arts offerings are available in Carlsbad, New York and select campuses around the world.

Programs, courses and classes include:

- Jewelry Design & Technology
- Graduate Jeweler
- Jewelry Design
- Comprehensive CAD/CAM for Jewelry
- Basic Repair and Setting Lab
- Intermediate Repair and Setting Lab

Learn more at GIA.edu

GIA®

World Headquarters
The Robert Mouawad Campus
5345 Armada Drive
Carlsbad, CA 92008 USA
T +1 760 603 4000
T +1 800 421 7250
E admissions@gia.edu

Seth Gould
Jeweler's Saw
steel, brass, mahogany
11 × 4 × 1.5 in.
Photo by Seth Gould

TECH TOOLKIT

In/Tangible Tools

The gift of a tool marks a meaningful relationship between a teacher, his student, and their community.

BY JEFFREY CLANCY

As an educator, I want students who are willing to be challenged, and productively challenge me in return. This type of student is rare. However, while teaching at Maine College of Art in Portland from 2006 to 2009, I had the privilege of working with one: the artist Seth Gould.

During his final semester, a few months before his undergrad thesis show, Seth said he wanted to work in forged steel and asked what I knew about it. I said, "Seth, strike while the iron is hot!" Then I did what I always do when guiding a student wishing to work outside of my immediate expertise: I called a friend. I explained the situation in this case to David Clemons, an artist who is knowledgeable about blacksmithing, and by the end of the week, a FedEx box arrived stuffed with technical information. I gave the parcel to Seth. Over the weekend, he built a small gas forge and began to teach himself blacksmithing, making experimental samples and completing technical exercises. By May, he presented a new body of work for his thesis that was well designed, conceptually thoughtful, and beautifully executed in material and technique.

I wanted to give Seth a token of appreciation, admiration, and encouragement for all of his hard work and courage. Again, I called David, and asked him if he could get in touch with his former blacksmithing mentor William Bastas at Austin Community College, who makes beautiful hammers. I have a few of my own, and wanted to purchase one for Seth. A few weeks later, an oddly weighted FedEx box arrived, holding a loosely wrapped, handwrought, 2.5-pound forging hammer. Missing from the box was an invoice. I gave the hammer to Seth and explained how I received it, and how this is how this community works: use it, and give back to the community that has just welcomed you.

Seth's tools are dependable, balanced, aesthetically distinct, exceptionally crafted, highly sought after, and an absolute pleasure to use.

Seth Gould gives back every day, and anyone who knows him will agree. Not so long ago, a graduate student asked me, "What do you know about blacksmithing?" He ended up spending a weekend working in Seth's shop in Penland, North Carolina. Seth makes work that is phenomenally crafted, insanely technical, and thoroughly researched with rigorous dedication, fearless curiosity, and uncompromising passion. Seth also makes hand-forged tools, and I own quite a few. I have hammers and measuring, marking, and forming stakes. I even have his amazing bottle opener that was both the punch line—and the solution—to a horrible but hilarious incident. Seth's tools are dependable, balanced, aesthetically distinct, exceptionally crafted, highly sought after, and an absolute pleasure to use. I lend them to students whom I know will appreciate the transfer of knowledge, energy, skill, preservation, and persistence from Seth's hand to their own while using them. For me, these tools are enhanced because they embody something intangible. I was once a mentor to Seth, and I will continue to use his tools to make my work.

Jeffrey Clancy is an artist and Assistant Professor in the Art Department at the University of Wisconsin-Madison.

Clancy's personal collection of tools made
by Seth Gould (http://www.sethgould.com)

THING OF THE PAST

Plumbing the Depths: Haptic Research, Historic Tools

A collection of historical tools catalyzes artistic discovery.

BY KENDALL REISS

I have always been enamored with the aesthetic qualities and haptic properties of tools and functional objects. Old tools that are of the hand—showing their history and age through wear markings, or a green patina forming on bronze fittings—have a story to tell. It's this feeling that has drawn me to Coggeshall Farm, a relic of Rhode Island's past. Situated atop a gently rolling hill above a picturesque salt marsh known locally as Mill Gut, the farmhouse on this forty-eight-acre site dates between 1785 and 1799. Now a living history museum, Coggeshall exemplifies the Federal period in American history. Outbuildings on the farm include a blacksmith shop and a wood shop, and an animal barn for the resident sheep and goats was built much later, after Coggeshall was founded as a museum in 1973. There is a stone pump house adjacent to Mill Gut with a vista across the marshy pond to the three-arched stone bridge that spans the mouth of the gut, which empties and fills with the waters of Narragansett Bay.

I grew up less than two miles south of Coggeshall, on Poppasquash Point. The landscape, coastline, meadows, hand-hewn fences, and stone walls factored heavily in my childhood explorations, knowledge of place, and understanding of my own identity. As a maker, educator, and thinker, I am continually aware of the connection between the mind and the hand, and how one falls into a rhythm of making. Tools are integral to this relationship; they allow me to achieve this state of flow, akin to meditation, while in the workshop or at the bench. They embody human thought processes and methods for solving problems. Historic tools provide a lens into these notions in the past, even as many tools still in use today are little changed from their original stone or bronze age designs.

The landscape and hand-built features of Poppasquash Point have long served as threads of inquiry for my artistic practice. During graduate school at the Rhode Island School of Design (RISD), I made plaster molds from shards of beach glass and objects collected there, then cast them as porcelain ruins. I was captivated by the idea that these broken punch cups and plates may have first been used on the tables and in the hands of my maternal ancestors.

This erasure of the past is endemic to Poppasquash Point. The peninsula of land on which Coggeshall Farm Museum is set, in what is now the town of Bristol, was home to the Wampanoag Native Americans before 1680. It was also a major site in King Philip's War, a conflict between Metacomet, the Wampanoag sachem (chief), and early colonists; Metacomet was executed here by the colonists in 1676. As I have grown to learn the truth of this place, I have trouble in reconciling my love for it with its problematic history.

Right, top:
Blacksmith shop at Coggeshall Farm Museum, August 2018.
Photo: Simone Schiess

Right, bottom:
Stone pump house adjacent to Mill Gut at Coggeshall Farm Museum.
Photo: Simone Schiess

Opposite page:
Hammers in the blacksmith shop at Coggeshall Farm Museum, August 2018.
Photo: Simone Schiess

Tim Bornstein also fell in love with the landscape at Coggeshall. A professor of law and industrial relations at the University of Massachusetts Amherst, Bornstein became fascinated by the aesthetic value of old tools, the hand of the maker, and historical objects made from these tools. In 1992, he decided to donate his collection of more than 2,000 historic tools to the museum. To Bornstein, Coggeshall not only felt like the right place for these objects because of its educational mission, but also because these tools could be handled, and when appropriate, used.

I learned of the Tim Bornstein collection from a friend who told me about a handplane made from whalebone on view at the museum. During my first visit to the collection, I came across a cast-iron mold for a plumb bob with very little information attached. The mold has a satisfyingly heavy weight to both of its halves; the cast iron has an aged patina on its surface; and the negative space inside the mold reveals many knicks and marks, yet undeniable simplicity and grace.

Metrology is the scientific study of weights and measures. A plumb bob, or plummet, is a conical weight that is usually pointed at the bottom end. Plummets hang from string and are used to determine a vertical reference line (plumb line). They date back to antiquity, yet are still used today, and can be used to think conceptually about weight—not only a physical load, but also an emotional or mental heaviness. After gathering permissions to use the mold for a project, my initial research began by exploring objects from ancient Egypt and Nubia at the Museum of Fine Arts, Boston (MFA), trying to gain historical context and a better understanding of the Coggeshall mold. I was able to handle ancient Nubian and Egyptian plummets made from granite, sandstone, limestone, and unfired mud. I felt an uncanny, mystical feeling, holding an object that another human formed in their hand from a lump of earth nearly 3,000 years ago. Plummet amulets made of hematite and other mineral-rich stones were placed in mummy wrappings

As a maker, educator, and thinker, I am continually aware of the connection between the mind and the hand, and how one falls into a rhythm of making.

Plummet, Egyptian,
Old Kingdom, Dynasty 6,
2323-2150 B.C.
mud
30 5/16 in. long
13.3457; Museum of Fine
Arts, Boston; Harvard
University - Boston Museum
of Fine Arts Expedition
Photo© Museum of
Fine Arts, Boston

in ancient Egypt, as the Egyptians believed these talismans would bring balance to the deceased in the afterlife following the divine order of Ma'at.[1]

For me, what's so appealing about the Coggeshall plumb bob mold is the satisfying roundness of the object when cast into a positive form. I looked at other objects from Egypt and Nubia: weights for gold, a wooden arm balance for a scale, and a bell. The bell came from a royal cemetery in the ancient Nubian city of Kush. Unique because of its material—silver, which was extremely rare—it would have been reserved only for high-ranking members of society.

In his book *A History of the World in 100 Objects,* Neil MacGregor, former director of the British Museum, includes a bronze bell from ancient China. He writes, "At the core of the teachings of Confucius was the fundamental need for every individual to understand and accept their place in the world. It was perhaps in this spirit that sets of Chinese bells took on such philosophical importance—reflecting the diversity but also the harmony that's created when each different bell is

Cast-iron mold for a plumb bob, Coggeshall Farm Museum

perfectly tuned and played in its proper sequence… To produce perfect tones they had to have absolutely standardized shapes, and the consistency of these shapes meant that the bells could also be used to measure standard volumes. And as the amount of bronze in each one was also carefully controlled, they could just as well provide standard weights."[2]

From the cast-iron plumb bob mold, I cast bronze bells that will become a permanent installation at Coggeshall Farm.[3] Placing the bells back into the landscape there creates a tangible connection to the site where the idea for the work began. Like Bornstein's tool collection, hopefully these objects will serve as an invitation to interaction. The bells will not have internal strikers, but will require a hammerlike tool and human interaction to sound. Programming around this project will invite visitors to look at this landscape through historical tools. We will fire up the forge in the blacksmith and use the power of the antique billows to strike hammer heads for the bells. The antique draw horse will be used to create handles for the hammers. Coupled with iron heads, they will become the tools that activate the bells to ring out.

At the core, this project is about how access to historical tools allows the artist a new lens of inquiry. Working with tools like the plumb bob mold is a form of haptic research, which is some of the most important work we do as object makers. It is how we come to know the world. Tactility transcends time; a utilitarian mold from the 1800s is put back into service in 2018 and dialogues with ancient Nubia. Through tactile interaction with the bells at Coggeshall, people can think deeply about their own connection to this place, the tools that were used here, and the weight of its history. The sounding of the bells is an attempt to offer solace.

Tactility transcends time; a utilitarian mold from the 1800s is put back into service in 2018 and dialogues with ancient Nubia.

Kendall Reiss is an artist, gallery owner, and Professor of the Practice at the School of the Museum of Fine Arts at Tufts University in Boston.

www.kendallreiss.com

1 E.A. Wallis Budge, *Osiris and the Egyptian Resurrection,* Volume 1. New York: G.P. Putnam's Sons, 1911 (309). / 2 Neil MacGregor, *A History of the World in 100 Objects*. New York: Penguin Books, 2013 (193). / 3 This project is supported in part by a grant from the Rhode Island State Council on the Arts. A selection of tools from the Tim Bornstein collection will be displayed alongside Reiss's cast objects from the plumb bob mold, as part of *Seeds of Inspiration,* an exhibition at the Bristol Art Museum, 10 Wardwell Street, Bristol, RI, from March 22–April 28, 2019. Installation of the bells and workshop to forge strikers will take place at Coggeshall Farm Museum, 1 Colt Drive, Bristol, RI, in June 2019. This project would not be possible without cooperation from the following individuals and organizations: Tim Bornstein, Eleanor Langham, McKayla Hoffman, Steve Lake, Coggeshall Farm Museum Board of Trustees, Bristol Art Museum, The Bristol Statehouse Foundation, Rhode Island State Council on the Arts.

Cheryl Swartz
Mesh Bracelet, 2000
Mesh: .999 silver and 22 karat gold; clasp: sterling silver with 22 karat ball on latch, citrine
7 1/2 × 1/2 in.
Photo: Steve Bigley

TECH ELEMENT

Hidden Powers: Putting Clasps at the Center of Jewelry

BY ANNA TABAKHOVA AND ALISON ANTELMAN

Even though most necklaces and bracelets wouldn't function without a clasp, closures are rarely the focus when writing or thinking about jewelry. Both forgotten and ubiquitous, clasps are both a necessity and an aesthetic opportunity. The creative jeweler can create clasps that are an integral component of an object's design, whether hidden in plain sight, or exposed with grandeur as both fastener *and* ornament. As a historian of clasps in jewelry (Anna) and a metalsmith and clasp teacher (Alison), we offer an exploration of the art of clasps today, through the examples of a variety of artists who show us the strong connections between contemporary and ancient closures.

A PERSONAL JOURNEY THROUGH CLASPS
By Anna Tabakhova

In 2005, I first discovered a bayonet clasp set on both sides, which was thus interchangeable and piqued my curiosity. Since then, I've conducted an international search for as many photographs and examples of clasps as possible. In 2013, the Musée des Arts Décoratifs in Paris invited me for a lecture on clasps. The interest was so great, I decided to write a book. Of the twenty-two museums I approached, half opened their collection to me, or commissioned special photos for the study. After four years of study, my book, *Clasps, 4,000 Years of Fasteners in Jewellery,* was published in 2017 featuring 300-plus photos and examples of work from 30 countries, representing 4,700 years of the history of clasps.

I hope my research on clasps across millennia inspires more metalsmiths and jewelers throughout the world, and gives them "the taste for clasp-making." Today's concerns about clasps are the same as they were 4,000 years ago. Did you know that 3,500 years ago the first pendant clasps and removable clasps already existed in Egyptian jewelry? Egyptian goldsmiths were facing the same question as today's jewelers: "Shall I hide or show the clasp?" Even in antique jewelry, the fundamental challenge in making clasps is to provide function and beauty at the same time. There only so many technical clasp solutions, and most of today's clasps are variations of original ancient fasteners—albeit very creative ones!

There is something unique about American clasps. My attention was first drawn to American costume jewelry of the twentieth century, which primarily featured box clasps, push-in friction clasps, two-sided sliding clasps, snap clasps, screw clasps, foldover box clasps, and interchangeable clasps. And through my travels, I have noticed that interest in the U.S. in handmade clasps continues to blossom. During a 2018 trip to San Francisco, Berkeley, and Pueblo, Colorado, I visited two exhibitions that presented a wealth of clever and beautiful mechanisms: some technical declinations of antique clasps, and other clasps that were well integrated into the design of the necklace or bracelet.1 There was a box-shaped clasp similar to those found in Egyptian jewelry, as well as some wonderful interpretations of hook-and-eye and toggle clasps. Some jewelers, designers, and metalsmiths "reinvent" antique clasps, unaware

Richard Salley
Twins (opened front and closed back), 2018
Chalcedony, rooster tail agate, sterling, custom clasp, 18-in. handmade chain
2 × 1 3/4 × 1/4 in.
Photo: Eric Smith

that they were invented millennia ago. One purpose of my book is to give artists the tools and inspiration to create their own clasps.

ARTISTS AND THEIR CLASPS
By Alison Antelman

A well-thought-out and integrated clasp can make a handmade piece into a work of art. The idea of making all parts of the jewelry was instilled in me at the early stage of my education in metals, when I took a mechanisms workshop. Aside from learning the skill at hand, the challenge provoked a curiosity to go further into the exploration of a design, pushing me to that uncomfortable point between failure and invention. I never consciously thought that I *had* to make my own clasps; I presumed it was part of the piece, a natural design element with functional necessities. Some clasps are simple hooks customized with a stone; others are more complex, fabricated to fit within the motif of the jewelry. For me, it is the design that dictates the elements necessary to make a complete piece of jewelry.

Both forgotten and ubiquitous, clasps are both a necessity and an aesthetic opportunity.

It is very satisfying to hear the click of a box clasp closure or the snap of a latch on the safety feature. Closures are an important aspect of the functionality of jewelry; they must be comfortable to use, and secure. Clasps usually take a back seat to the piece itself; yet a handmade clasp brings the work to a higher level. I tell my students that making a clasp is not necessarily difficult, it's just time-consuming. When teaching a clasp workshop, I want my students to think kinetically about form and function. I teach two styles of clasps; however, the world of connections in jewelry is infinite.

Over four millennia, metalsmiths have endeavored to make clasps that are both useful and beautiful. The claspmakers featured here share a sense of obligation to the wearer, an obsession with quality and functionality, and a sense of playful exploration along with that of discovery. They are tinkerers, inventors, and innovators, channeling their ancient Egyptian predecessors.

Anna Tabakhova is a French jewelry artist and the author of the book Clasps, 4,000 Years of Fasteners in Jewellery.

Alison Antelman is a metalsmith, educator, and maker of clasps in Berkeley, California.

1 *Clasps: Functional Adornment,* Macchiarini Creative Design Gallery, San Francisco, April 14–June 24, 2018; *Show Your Clasps,* Colorado Center for Metal Arts, Pueblo, Colorado, May 3, 2018.

Michael Boyd
Ruby Necklace, 2017
22 karat yellow gold; 18 karat yellow, red, and white gold; Mozambique agate, natural unheated ruby, sapphires

The following jewelers have created clasps that connect seamlessly. Some are integrated and hidden; some are a main focus of the work. These clasps are related to the long history of innovative claspmaking in a variety of ways.

Suzanne Williams, a jeweler and teacher from Denver, Colorado, says that "people like clever clasps." Williams has explored and researched more than 200 types of latches and connectors, including historical, contemporary, and commercial clasps, which she has developed into categories based around function. Her intense research, along with influences from everyday items including pill-bottle screwtops, garter clips for stockings, and hasp mechanisms, has inspired her to fabricate examples. Her toggle variation appears to be a decorative pendant, leaving one unable to identify where the clasp actually is.

Thea Izzi, a jewelry designer based in Rhode Island, says, "Certain clasps have to be modified for the customer. My responsibility as a designer is to come up with a clasp specific to a customer's needs." Clasp designs—historically or in contemporary jewelry—are infinite. A simple S hook evolves into a circle with a slit in it, mimicking the rest of the elements in Izzi's *Eclipse* necklace, one of many unique clasps incorporated into her original designs. There is a natural flow in her *Fan* necklace. The clasp, a hand-fabricated spiral, is secure and barely noticeable amid the repeated pattern of the forms.

Michael Boyd, a jeweler and lapidary from Pueblo, Colorado, says that for him, creating clasps is "all about the process, the discovery, and being innovative. Art is the end result." His inventive use of connections throughout the fabrication process makes his work cohesive. Boyd pays as much attention to function as to design, and cuts his own stones. Experimentation and play often lead to several new designs, with the clasp a unifying aspect in Boyd's jewelry. In his *Ruby Necklace,* he turns the box clasp perpendicular as an added safety measure; not wanting to use an added latch, he provides this solution to maintain the aesthetic while fulfilling the need for security.

Lissa Queeny Matthews, a model maker and metalsmith from Kingston, New York, says that while "others count sheep at night, I think of mechanisms; it keeps me relaxed." Matthews worked for Van Cleef & Arpels, along with their manufacturer, as a bench jeweler; therefore, she has an intense training in jewelry

Creating clasps is "all about the process, the discovery, and being innovative. Art is the end result."

Above:
Alison Antelman
Mini Metro Bracelet, 2015
oxidized silver, 18 karat and 22 karat gold, rubies, black and white diamonds
6 1/2 × 1/2 × 1/4 in.
Photo: Eric Smith

Left:
Suzanne Williams
Dragonfly Clasp necklace (open and closed), 2007
sterling silver, 18 karat gold, rubellite tourmaline, diamonds, freshwater pearl
2 1/8 × 1 3/4 in.
Photo: Priscilla Montoya

fabrication. She creates moving parts and uses nothing premade. Matthews's desire to create mechanical movements came well before her career. As a child, she hoped for her Thumbelina doll to break in order to disassemble it and discover how it was made. In her own jewelry, Matthews creates a surprise that either stands out or blends in: "It's what I love to do," she says. She often has the clasp figured out well before the rest of the piece.

Ryan Gardner, a jewelry artist from Pueblo, Colorado, simply states: "The clasp is part of the piece." He makes sure the function is not overly complicated, using a simple hook and eye with a stone as an accent, or creating a clasp as the main feature of the work; either way, the viewer is happily surprised upon opening it. *Toggle Variation Necklace* is designed so that the closure stands in the center of the ring and does not slide over. It looks like a simple pendant, when in fact pulling at the stone reveals its function as a front-worn clasp.

Richard Salley, based in Rio Vista, California, was a public-school teacher for thirty-two years before devoting all of his time as a jeweler and teacher of workshops focused on kinetics in design. "The jewelry wouldn't exist without the clasp," he says. For Salley, part of the challenge is invention: figuring out ways of connecting all of the handmade components without any premade components. His prong clasp is a playful approach to hiding the clasp in plain sight. The wearer knows the secret, which is revealed to others only when removed.

Cheryl Swarz, a jeweler and metalsmith from Westcliffe, Colorado, says, "It's nice to know that these clasps have lasted through the years. If there's going to be jewelry, there's a need for a clasp. I'm happy to solve that problem." Her clasps look noticeably similar to those created by Egyptian metalsmiths 3,500 years ago. The Egyptian box-shaped clasp (so called by Egyptologists) is composed of a box and a rectangular-shaped fitted lid, both pierced to allow a pin to pass through, which brings the two pieces into alignment and secures the clasp. When Swarz discovered the similarity of her clasp to those historical predecessors, she "felt an emotional connection to the craftsmen. These things were designed and made by fine artists. When trying to imagine their hands, their tools, their workplace, I got goosebumps."

Peter Antor, a studio artist in Chicago, wants the clasp to blend in and become part of the aesthetic of the piece. He is always looking for solutions to design problems. Antor first used mechanisms in his sculptural pieces, which he then adapted for jewelry. His architecturally designed work, which includes wood, concrete, and precious metal, has a kinetic structure that morphs jewelry and sculpture together. In his *Linear Grid* bracelet, the tension clasp is hidden within the design, masked as a hinge, while the opposite side mirrors it. You can't tell which side is the clasp and which is the hinge.

Turtle Media Screen Doors, 2017
copper and pigment; patinated and lacquered and wrapped over wood and aluminum frames
61 × 82 × 3 in.

TECH TALK

Translating Jewelry Techniques to Larger Scales: Three Examples

BY VICTORIA LANSFORD

WHAT HAPPENS when a metalsmith who typically works on a small scale gets the idea—and a commission—that necessitates working on a huge scale? Which tools do you use? Will the metal behave the same way? How do you etch it, form it, anneal it, saw it—and how far, literally, can you push it?

As a student at the College of the Arts at Georgia State University, constraints on time and money kept my work small, but didn't curb my enthusiasm for the technique of Eastern repoussé. My scale choice repeatedly drew me into an argument with my teacher, artist-in-residence Gia Gogishvili. He would look at my jewelry-sized Eastern repoussé and chasing pieces, heave a long sigh, and say, "Vic-toooohhhhriaaa! Filigree: jewelry. Repoussé: silversmithing." I would shake my head and say, adornment jangling, "But Gia, look at these cool repoussé fish earrings I made!" Gia would roll his eyes and sigh, knowing he'd have the same argument with his stubborn female American student again the next week.

Like me, a handful of other North American artists such as Linda Kindler Priest and John Cogswell also made brooches and small objects from repoussé, but for centuries the technique was primarily used for larger functional objects from North Africa, Europe, and Asia; hence my Tblisi-born teacher's bias. In tourist destinations like Chiang Mai, Thailand, craftsmen can still be seen chasing bowls the size of small bathtubs. Adapting the technique to a jewelry scale became a natural way for me to teach the process to students in a shorter time, making repoussé jewelry hugely popular among metal artists around the world.

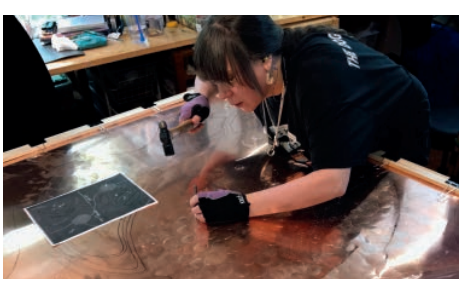
In 2011, I embarked on a series of artist books that combined illumination and calligraphy, with etched or Eastern repoussé copper covers. In 2015, a British company that builds yachts approached me to ask if I could repeat my process in multiples to create a tiled room divider. My enthusiastic "Yes, sure!" brought another question: "Could you also etch single copper panels for double doors that are eighty-two inches wide and sixty-one inches high?" "No," I said, "but I could repoussé them, and trust me, they'd be amazing."

Example One:
Turtle Media Screen Doors for Bespoke Sixty-Nine-Meter Superyacht

I was commissioned to create Eastern repoussé panels that were forged and wrapped around wood and aluminum frames. These were to act as motorized sliding pocket doors to cover the media screen in the lounge of a bespoke sixty-nine-meter superyacht built in Europe. The panels were forged from four sheets of copper riveted together to form the two pocket doors. Per the client's request, the design was rendered in multiple circular textures and then drilled to allow light through. The pigmented and patinated doors were spray-lacquered to protect the finish.

Though I had never seen or done repoussé quite this large, I knew the physics of Eastern repoussé would scale. But I also knew there would be hundreds of logistical details to figure out, such as how to keep the huge sheets of copper stable while I worked, and how to reach the center of the design without breaking my back. However, I was able find the best solutions well ahead of time, and complete the project with relatively few surprises.

Adaptations:
I needed someone with extensive forging/hammering (and etching) experience who would commit to this undertaking. For the final three months of the project, Deanna Pastel, studio director at Creative Side Jewelry Academy in Austin, Texas, commuted to Atlanta to work with me, and matched my energy—key to my meeting the deadline! There was more flat background than I would normally design, so I used 22-gauge copper (instead of 24-gauge) to prevent it from warping. Copper more than three feet wide is available through online architectural suppliers.

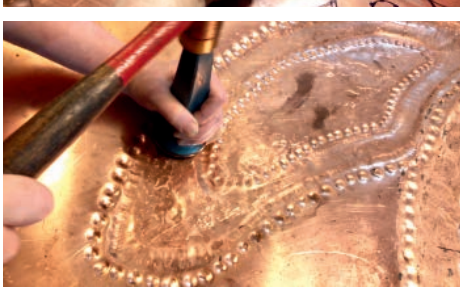


The design called for the panels to be wrapped and permanently screwed to frames supplied by the shipyard. This gave me the idea to use canvas stretchers to stabilize the sheets while in progress. We attached them with bungee cords, large binder clips, and lots of duct tape. Weightlifting gloves and thick, flexible first-aid tape helped absorb the shock to our hands when hammering.

Since I knew annealing wouldn't be possible on the full-scale pieces, I first tested how much relief I could get on the twelve-inch sample section that I created for the client in 2016. Because the 22-gauge copper was dead soft, I could do three very intense rounds of Eastern repoussé without annealing: 1) chasing the outlines and stamping all the larger circles; 2) hammering the relief from the back with all the adaptations of push tools; 3) chasing from the front to create detail around the eyes, the consistent curves of the head, flippers, and shells, and the circular textures of various sizes.

The artist drilling the right-side panel of the screen

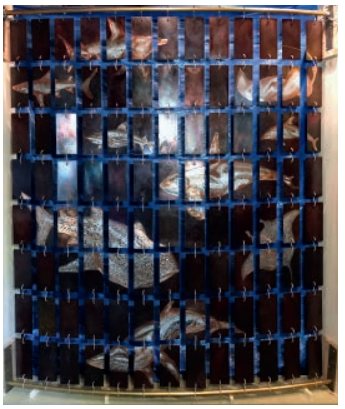
To accommodate the larger size, I adapted or repurposed tools that were already in the studio. To push out larger areas of relief, my large push tool became my edging tool. Mushroom stakes and large Bonny Doon dapping punches became my large push tools. Sometimes I hit the metal directly into the plasticine with a urethane hammer from the back, or planishing hammers from the front.



For the turtles' smaller circle textures, I used nail sets made for sinking nails flush into wood molding from the hardware store. For the larger circles, I purchased punches used for cutting rubber washers, then sanded their edges to be less sharp. These adapted circle stamps worked for all but the largest clusters of domes in the background; those had to be hand chased with the large line tool.

My great-grandfather's anvil became my oversized bench block when chasing lines and stamping circles. We spread slabs of plasticine on top of thick plastic bags so they were easy to slide around under the copper. A large baking sheet made the perfect pitch bowl to support the heads and flippers. The shell was too large and deep for pitch: the amount of pitch required to fill the shells meant it got too cold and kept crumbling. We used mushroom stakes and the large dapping punches to support specific areas of the shell from underneath. To prevent work hardening from flexing or warping while working from the front, we stuffed the relief areas with pillows, and placed inexpensive adjustable tripods under the canvas stretchers' edges for extra support. When we ran out of space in the studio, we took over my screened-in porch and deck.

Shears and power tools left jagged edges, so I used a very balanced and rigid six-inch Knew Concepts Titanium "Birdcage" Saw with the blade at 45 degrees to cut the curves along the riveting seam, then I smoothed the edges with a needle file and a steel burnisher.



Etched Screen, 2017
copper, steel, twine,
and pigment; patinated,
lacquered, and suspended
within a wood, steel,
and brass frame
98 × 75 × 12 in.

Example Two:
Etched Copper Room Divider for Bespoke Sixty-Nine-Meter Superyacht

This commissioned piece is located in the main salon on the same vessel. The curve of the screen conforms to the layout of the room, and allows light to filter in between the panels. The bright copper of the raised arcs and the burgundy and blue hues of the patinated background glow in the sun-filled space. The framework, shown at my studio, is completely hidden by columns built into the superyacht, and the screen is lit from above.

Adaptations:
Since this project was composed of smaller sections, the primary considerations were logistical: keeping track of the 104 two-sided, etched panels, each 218mm by 105mm, that form the forward and aft side pictures; assembly-lining the steps for efficiency; and using larger equipment to save time and joint fatigue.

The leverage power of a guillotine bench shear made cutting the 20-gauge copper much easier.

To punch the 208 holes for the twine-wrapped S hooks, I made a brass sheet template to fit in a disc cutter so that the copper panels instantly lined up with the correct hole each time. Instead of a hammer, I used an Electric Bonny Doon Hydraulic Press, fitted with the adapter punch for a Swanstrom Disc Cutter. The holes' size and exact placement were key to making the panels hang rigidly in the curved formation.

After hand-scrubbing twelve panels, I discovered the best way to clean them was in my dishwasher. The client loved the "pull" texture that comes with non-agitated ferric chloride etching. We used Press-N-Peel, laser-printed with the design, then we handpainted all the meticulous detail with Dr. Martin's India Ink.

To keep track of the two-sided design, and to maintain the exact 30mm spaces it spanned, I cut a chipboard template to hold six panels and laid it on a thick sheet of clear Plexiglas. Before transferring the next portion of the design, we lifted up the plexi to look at the underside and double-check that its design matched correctly. The panels with blank backgrounds could be etched on both sides at once. Most panels, however, had to be prepped, masked on the blank sides, and etched on one side, then prepped on the second side, masked on the first side, and etched on the second side.

Graphic artist Uduak Ita managed the huge digital files for the project. Though she is not a metalsmith, her painting skills proved invaluable as she helped to prep the panels, apply the white wax-based pigment, and polish the raised areas. It took twice as long to prep the panels as it did to etch them, so we doubled up prepping and polishing panels when it was too late at night to hammer on the *Turtle Doors*. My son, Skyler, masked the backs of the non-etching sides in the wee hours so we'd be ready to etch them in the morning. Electrical tape (around the edges) and outdoor-sign vinyl made the perfect masking film. I built an outdoor etching station for extra space and safety. A folding table held more etching trays. Twelve panels proved to be the most efficient number of panels to prep or etch at one time.

Example Three:
Giving Voice, Mokume Gane and Eastern Repoussé Front Cover

Giving Voice is my six-year, multidisciplinary magnum opus. It's both a printed book and an interactive ebook that I created about the connections we form and how they can dramatically change our paths, featuring my illuminated hand-lettered artwork, animations by Steve Walker, jazz by Roddy

Eastern Repoussé: What's the Difference?

In metalsmithing, the term "repoussé" means to strike sheet metal freehand from the back with punches to create a bas relief. The term "chasing" means to strike from the front to countersink, refine repoussé, or create incised decoration. Eastern repoussé is a specific technical process, not merely a style. It offers the unique ability to create multiple defined levels of relief at any desired height and in any design style (within the laws of physics and metallurgy).

Repoussé work features a matrix (or background) of metal around the repoussé area, except when working on cuff bracelets or rings. Each traditionally shaped Eastern repoussé tool has a specific purpose, and the line tools are far less sharp than their "Western" counterparts. The oval push tools are used to create relief. One of these is the edging tool, the secret weapon for achieving greater depth. The round planishing tools are used for refining relief from the front. The tools must always strike the metal perpendicular to the surface, no matter how the curvature of the metal changes, and must be held just above the necks. The lower you hold the

Eastern Repoussé tools

Giving Voice, 2018. Shibuichi, copper, sterling. 11.25 × 7.25 × 2 in.

Noll, and an introduction from best-selling author and artist Nick Bantock.

One of my specializations is patterning mokume gane metal through the process of Eastern repoussé, so adding it to my illuminated book series' covers seemed a natural progression. Mokume gane is a centuries-old Japanese technique of fusing different layers of non-ferrous metals to create a single sheet, then displacing them through carving or hammering, and finally grinding down the surface of the metal to reveal the cross section of all those different layers within the sheet. Chemical patinas deepen the alloys' colors to highlight their contrast.

Adaptations:
One of my favorite tools for larger Eastern repoussé projects is the ball side of a chasing hammer. I use it directly on the metal in place of the large push tool. It leaves the relief a little lumpy, so to smooth it out, I go over the marks with a planishing hammer.

If you have a urethane-filled containment box large enough, you can use a hydraulic press fitted with domes or dapping punches to do the initial overall relief instead of hammering it. The larger the sheet of metal, the more height you can get, and more height offers more levels of relief. I hammered the entire piece up to the level of the background behind the sun rays. After relining the sun over pitch from the front, I could see it from the back to push it out further. Once the sun had enough height, I relined the letters and pushed them even further so they appear to sit on top of the sun rays.

Normally, I planish Eastern repoussé to the point of obsession. For *Giving Voice,* I opted to reveal the mokume on the sun, but leave the top layer of shibuichi (an alloy of 95 percent copper and 5 percent silver) on the lettering and the background. I keep a large blob of pitch on top of my pitch bowl instead of leaving it flat. The blob supports the metal well above the lip of the bowl. This allows better access for chasing near the edges. The mound on my eight-inch pitch bowl could accommodate more than half of *Giving Voice*'s cover at a time.

Scale Up and Experiment!
Blurring the lines between goldsmithing and silversmithing techniques when creating both jewelry and functional objects allows me to do with metal what fusion cuisine does with food. Metalsmiths tend to see a thousand possibilities in any tool, and have a knack for scheming and creative problem solving. Whether scaling your processes up to book size or wall size, your ability to adapt, encourage others, and experiment are your best assets in the studio.

Victoria Lansford's award-winning artwork ranges in scale from wearable art jewelry to architectural metal installations for one of the world's largest superyachts. Her instructional video series Metal Techniques of Bronze Age Masters *has generated an international revival of ancient metalsmithing processes around the world.* https://victorialansford.com

Further Resources:
For more, including additional process and detail shots and an animation of the Eastern repoussé and mokume gane book cover, visit https://www.snagmetalsmith.org/metalsmith-magazine/metalsmith-extra/

tool, the more control you have over where it hits your work. The areas to be "pushed out," as well as most interior design lines, are first lightly delineated from the front with the large line tool over a steel bench block. The resulting echo marks on the back indicate where the relief will be. The exterior is relined each time after hammering from the back in order to keep the background metal consistent.

Plasticine, pitch, and bench blocks are all used to support the metal at different points in the process. Using plasticine (non-hardening modeling clay) when hammering from the back allows the metal to expand into much higher relief. In antiquity, smiths used clay for this step. Supporting the metal with pitch gives more resistance when refining relief from the front, which allows for greater detail and also keeps the relief from caving back in on itself, while still allowing some countersinking if desired.

Eastern repoussé is almost always done on 24-gauge, non-ferrous sheet. This thinner metal gives beautifully and allows crisp detail. (It's also easier on the smith's joints.) When the background on a larger work must be thicker, 22-gauge sheet will work. Typically, Eastern repoussé is done on sterling, copper, or 18k gold. (Fine silver in any gauge lacks the resistance needed to maintain details while working.) Working in 24-gauge sheet makes using harder alloys like sterling possible, which allows for stronger finished pieces. I've learned that the most visually appealing ways to make the finished edges look thicker are to fold the outside edge under or solder a wire rim around a piece before it is sawed out. Also, tacking the wire rim to the edge of the repoussé with a micro-TIG welder first makes soldering it easy.

TECH TEACH

Utilizing Digital Processes for Layout and Design Transfer

BY FRANKIE FLOOD

It can be daunting even for seasoned metalsmiths to make that first center punch mark or cut into the precious materials that we work with. The challenge of transferring a design from an initial sketch to metal is the focus of this first article in a series focused on the integration of digital and traditional techniques intended to serve as an entry point for learning about tools that any metalsmith can not only use to increase accuracy and productivity, but also incorporate into their larger practice. I have found that the integration of digital tools for design transfer to metal helps my students hone and clarify their design intent, and these skills can likewise help any artist expand and grow.

Building on Transfer Traditions

Many metalsmiths begin an object by creating a final rendering of a completed piece, from which they can create full-scale working drawings or orthographic plan drawings for taking measurements and creating templates for cutting components. These scale drawings are then used to transcribe the design to metal for guidelines as the object is cut and formed. This layout consists of marking the sheet metal so that the flat shape, or pattern, or part is indicated for cutting (drilling, sawing, piercing), bending or forming operations, and etching.

Traditionally, metalsmiths have used techniques including scribe transfer, direct transfer, and adhesive transfer.

- ***Scribe Transfer*** refers to the use of a black permanent marker or layout fluid (such as Dykem Blue) to thoroughly cover the surface of the sheet of metal, after which a scribe is used to carefully scratch though the coated surface to make a thin clear line. Drafting tools such as steel rulers, dividers, calipers, and templates help obtain the desired shapes.
- ***Direct Transfer*** refers to the process of cleaning the surface of the metal with soap and water, painting on a thin coat of water-based white paint, and when dry, using carbon paper to trace over the design with a ballpoint pen or a hard leaded pencil.
- ***Adhesion Transfer*** is the process of applying a coating of adhesive (rubber cement or spray adhesive) to the back of the pattern, placing the pattern into position on the metal, and using a burnisher to rub it down before cutting, drilling, or forming.

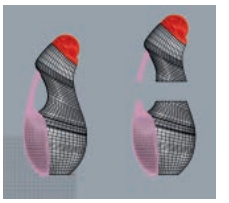
Taking the Plunge into Digital

Transposing a drawing to metal accurately—whether for a simple piece or an intricate one—allows the original design intent to be best realized, and integrating digital drawing skills is an evolution of traditional methods. A rough sketch can be photographed on your phone and then "imported" into a CAD (computer-aided design) modeling program. This .jpg image can then be used as a background template over which you can create a vector-based drawing. This drawing can then be copied, pasted, and scaled to suit your needs within any modeling software. Various output methods—from those as simple as an inkjet or laser printer that prints onto a sheet of paper to those as complex as a 3D printer that prints onto metal—translate the digital model to your material.

Learning a program's basic features will unlock some of its potential. That said, a user does not need to learn every aspect of a given software in order to integrate it into their workflow. Many CAD programs can be used by the novice, despite the fact that they are capable of much more. There are more options than ever before for learning software via online tutorials, and there are also several open-source and cost-effective CAD programs available.

The integration of digital tools for design transfer to metal helps my students hone and clarify their design intent, and these skills can likewise help any artist expand and grow.

Casey Newberg
Birth pitcher, 2018
chrome-plated electroformed copper, PLA, automotive paint
7 × 5 1/2 × 15 in.
Photo: Casey Newberg



3D CAD model for 3D printing parts (Casey Newberg *Birth* pitcher process)

electroformed 3D print (Casey Newberg *Birth* pitcher process)

RECOMMENDED SOFTWARE

Rhino 3D
(https://www.rhino3d.com/)

ADVANTAGES:

- The cost allows you to own the software until a new (major update) version comes out, at which time you can upgrade for a reduced price. Several years between updates has been the norm.
- There are many software modules called plug-ins that extend the potential of Rhino, some of which—but not all—are free. RhinoGold is a pay-for-use plug-in that is specific to jewelers, as is RhinoCAM, which allows users to create CAM toolpaths for CNC machining. Grasshopper is a free plug-in that allows for algorithmic modeling.
- Large network of users with plenty of tutorials.

DISADVANTAGES:

- Learning curve can be steep due to all of the commands and features.

TinkerCAD
(https://www.tinkercad.com/)

ADVANTAGES:

- Free open-source, browser-based software.
- Shallow learning curve due to use of primitive shapes for 3D modeling.
- Large network of users with plenty of tutorials.

DISADVANTAGES:

- Basic interface does not allow for more advanced modeling features that other CAD software packages contain.
- Primarily intended for entry-level users who want to create 3D-printable forms.

Inkscape
(https://inkscape.org/)

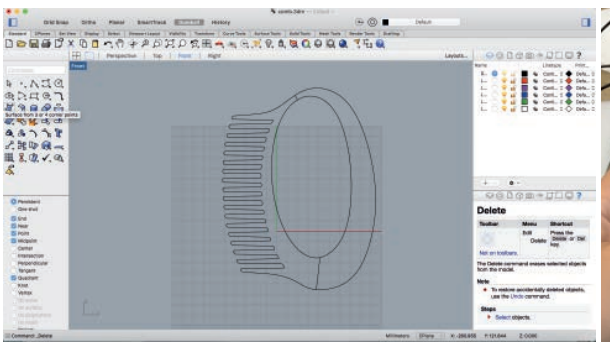
ADVANTAGES:

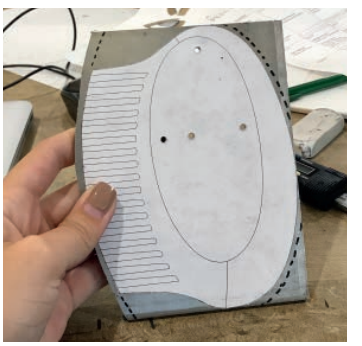
- Free open-source software that is comparable to Illustrator.

DISADVANTAGES:

- 2D-based drawing only; does not allow for 3D drawing once your experience level increases.

Casey Newberg
Recurrent comb, 2018
aluminum, jarrah
4 3/10 × 1 × 7 in.
Photo: Phil Renato





Left:
CAD as layout tool (Casey Newberg *Recurrent* comb process)

Right:
CAD layout used for sawing template (Casey Newberg *Recurrent* comb process)

Some of the benefits include greater accuracy, registration of design layers, and repeatability in creating multiples. Most CAD modeling software allows for tolerances greater than .0001—useful to metalsmiths working with complex assemblies of parts that require close tolerances. The fact that a design layout can be repeated over and over with the same accuracy by an output device such as a inkjet or laser printer, vinyl cutter, laser cutter, or other CNC (computer numerical control) device makes the integration of digital processes a real plus for metalsmiths working with multiples.

Potential Uses of Digital Layout When Combined with Traditional Metalsmithing Processes: Layout for Sawing

All CAD software is capable of generating scale drawings that can be printed on a traditional inkjet or laser printer. These printed layouts can be applied via adhesion transfer to create accurate layouts for center-punching complex hole patterns and for sawing and piercing.

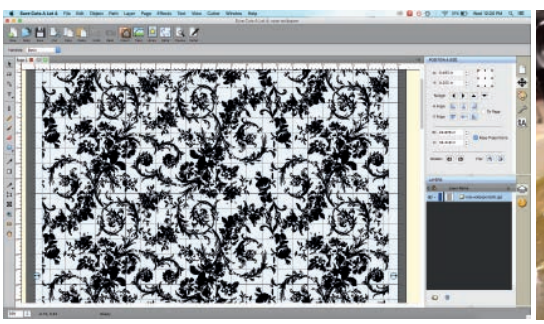
All CAD software is capable of generating scale drawings that can be printed on a traditional inkjet or laser printer.

Layout and Resist for Chemical Etching Processes

CAD vector-based drawings can be combined with vinyl-cutting machines to create "stickers" that can be useful as etching resists. Detail is sometimes limited based on the scale of the design, but most vinyl cutters are capable of very fine detail. Vinyl cutters are very affordable and usually include software that can also be used for creating drawings straight out of the box. These vinyl stickers can also be used as a form of adhesion transfer for sawing. The negative/positive output allows the user to plan what parts of the design will be removed during the "weeding" process before executing the design in metal.

Laser Cutting and Etching

CAD vector-based drawings can be combined with a laser cutter to create layouts for sawing, drilling, or etching. Even low-powered laser cutters (lasers not meant for cutting metal) can burn away or mark coatings that have been applied to metal. A digital design for traditional chemical or electro-etching can be prepared by spraypainting metal to serve as the resist. The laser is then used to "burn away" areas that will later be chemically etched. Most laser



Top:
Travis Donovan
Hatchet (Rococo Floral), 2019
tool steel, wood
13 × 6 × 1 in.
Photo:
Travis Donovan

Bottom left:
design for vinyl cutting (Travis Donovan Hatchet (*Rococo Floral*) process)

Bottom right:
vinyl used as an etching resist (Travis Donovan Hatchet (*Rococo Floral*) process)

cutters have preset settings for etching painted brass. Traditional asphaltum grounds may also be used, as the laser will "burn" through the resist but not impact the metal. The accuracy of the laser allows for detail that rivals that of PnP etching paper. Most low-powered lasers also have settings for etching glass (enamel) as well as anodized aluminum, if you decide to use your digital layout as a final surface-marking technique. The laser can also mark through layout fluid as a scribe transfer technique. The result will be lighter than scribing but can create a quick and accurate layout for marking holes and sawing. Vector drawings could also be combined with high-powered lasers for cutting metal, and for creating multiples via vendors that own these expensive machines and who specialize in laser-cutting metal. Having a vector drawing that most shops use with their industrial equipment will allow you to receive an accurate quote for your project.

CNC Machining Processes

The vector-based drawings that CAD software creates can be combined with a CNC mill or CNC lathe to create CAM (Computer Aided Manufacturing) toolpaths for cutting parts from sheet, plate, round, or square stock. 2D CAM toolpaths are created from the vector drawing and operations such as face milling, drilling, pocketing, and profiling use end mills and tool bits to subtractively carve your design in metal. If a few more

RECOMMENDED SOFTWARE

Autodesk Fusion 360
(https://www.autodesk.com/products/fusion-360/overview)

ADVANTAGES:
- Large network of users with plenty of tutorials.
- User-friendly interface with multiple modes of modeling/drawing.
- Integrates some of the best software tools into one software package.
- Included CAM toolpath generation software for free.
- Powerful, full-featured modeling software for an amazing price.

DISADVANTAGES:
- Frequent updates that require you to update on a regular basis.

Sure Cuts A Lot
(http://surecutsalot.com/index.php)

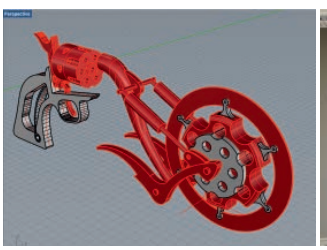
ADVANTAGES:
- Cost of software allows you to own the software until a new (major update) version.
- Packaged with most vinyl cutters (included with the price of the vinyl cutter).
- Shallow learning curve.
- Has a basic autotrace feature for creating vector graphics from photos.

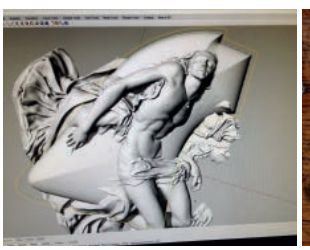
DISADVANTAGES:
- 2D-based drawing only; does not allow for 3D drawing once your experience level increases.
- Primarily intended for use specifically with vinyl cutters.

Adobe Illustrator
(https://www.adobe.com/products/illustrator.html)

ADVANTAGES:
- Large network of users with plenty of tutorials.

DISADVANTAGES:
- Subscription-based system.
- 2D-based drawing only; does not allow for 3D drawing once your experience level increases.





3D CAD models for CNC cutting
(Frankie Flood *Peacemaker/Piecemaker* pizza cutter process)

final CNC machined parts
(Frankie Flood *Peacemaker/ Piecemaker* pizza cutter process)

steps are taken beyond that of creating the basic 2D-based vector drawing, and expanded into 3D modeling techniques (such as extrusions and lofts), then 3D CAM toolpaths can be generated for subtractively roughing and finishing 3D metal objects.

3D Printing for Mold Making

The basic vector drawing can be expanded upon via 3D modeling (similar to the aforementioned 3D CNC machining processes). A 3D printer can then be used to create a printed object in plastic or in wax-based resins and then used as a "lost wax" pattern for casting or electroforming. Desktop FDM 3D printers are now available for under $250, and resin-based DLP 3D printers are now available for under $550. FDM printers typically print in plastic, and detail for ring-sized objects is limited, but DLP and SLA printers use resin and have a much higher resolution, capable of ring-scale detail. In addition, the model can be printed by a vendor that utilizes more expensive metal printing processes. Using 3D printing allows for unlimited complexity of form that would normally cost more if using traditional machining processes that require fixturing.

Frankie Flood is an Associate Professor and Area Head of the Metalsmithing and Jewelry Design area at Appalachian State University in Boone, North Carolina.

Above, top: Frankie Flood, *Peacemaker/ Piecemaker pizza cutter*, 2016
aluminum, stainless steel, steel, zinc, brass, ball bearings
6 × 14 × 3 in.
Photo: Frankie Flood

SKETCHBOOK TO DIGITAL FILE

Import the photo to CAD software and scale

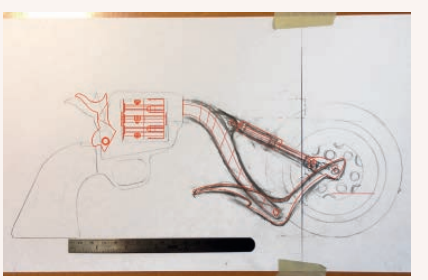
Almost every CAD software program has the option to import a photo (.jpg) to be used as a background that can be "traced" over. Scale the image using the ruler in the photograph, if you want to preserve the scale of your sketchbook drawing. All CAD software will have specific units; make sure to select the units you want the final image to be exported to on your specific digital output device.

Vector drawing using CAD software

A photograph of the sketch can be drawn over and translated into a vector drawing by using the vector-based paths (points, lines, arcs, circles, squares, ellipses) that CAD software uses to define a 2D drawing.

Autotrace

Some CAD software has a "tracing" option that autotraces the photograph. This works well with black-and-white photographs and high-contrast images. The photograph can be manipulated via photo editing software to increase threshold or contrast to aid in this process. Adobe Illustrator contains a command called LiveTrace that autotraces an image; the LiveTrace or autotrace processes usually results in a less accurate tracing or "messy" path. That said, for the novice this method offers fast results and helps overcome the frustration of learning how to manually trace a drawing.



traced design in CAD software
(Frankie Flood *Peacemaker/ Piecemaker* pizza cutter process)

Get Ready for Form 3

formlabs

Save money. Speed up production.
Rio Grande, in partnership with Formlabs, is proud to bring jewelers the Form 3, a compact powerhouse three years in the making. Low Force Stereolithography creates smooth prototypes with meticulous surfaces. A simple cartridge system makes switching resins effortless. And scalable components help you meet demand, now and forever.

Experience the 3D printing power of Form 3!
Join Rio Grande at JCK.

JCK

Booth #52057
(May 31–June 3)

Castable 3D-printed models with tear-away supports reduce finishing time.

RIO GRANDE®
Since 1944

75 YEAR ANNIVERSARY

For your bench. At your side.

riogrande.com 800.545.6566 #RioJeweler

GET READY • GET RELIEF • GET CONNECTED

Readiness + Relief

CERF+ provides:

- Resources + Info
- Education + Training
- Advocacy + Research
- Emergency Relief
- Emergency Readiness
- Career Protection Tools

Join The Artists Safety Net

e-news YouTube

cerf+
The Artists Safety Net
www.cerfplus.org